Audentes fortuna juvat...

THE BEACON

Vol. 1, No.1 - Spring 2004

Quarterly Newsletter
of the
JAPAN-U.S. Science, Technology & Space Applications Program (JUSTSAP)

14TH ANNUAL WORKSHOP PIONEERS NEW PATHWAYS FOR JUSTSAP

More than 80 international delegates from government agencies, industry, academia and NGOs, along with 72 students representing 12 U.S. and Japanese universities, converged in Honolulu last November for the 14th Annual Workshop of the Japan-US Science, Technology and Space Application Program (JUSTSAP).

Held at the Sheraton Waikiki from November 15 – 18, 2003, the workshop featured concurrent symposia focusing on the development of space power systems, microgravity research, advanced satellite communications, small satellite launcher systems, and international networks and protocols for disaster monitoring, management and mitigation. The workshop also hosted the 6th Annual University Space Systems Symposium, which brings together outstanding students from Japan and the United States to mentor with professionals from various space agencies and research institutions in the design, development and deployment of space-based communications and remote sensing projects (see article on Page 2).

(Continued on Page 2)

NEW LEADERSHIP AT THE TOP

Dr. Ryojiro Akiba

Mr. Stephen Day

Dr. Frank Schowengerdt

Mr. Takaji Kuroda

Elected by the JUSTSAP Executive Steering Committee at the November 2003 Workshop, Mr. Stephen Day was chosen to replace Dr. Ryojiro Akiba, former Director General of ISAS and advisor to USEF, who completed an outstanding two-year term as JUSTSAP Chairman (thank you Akiba-san!). CEO of International Ventures Associates and founding member of the Vail Group LLC, Mr. Day formerly served as JUSTSAP Vice-Chairman representing the United States. This position has now been filled by Dr. Frank Schowengerdt, Director of NASA's New Product Development Division in Washington, D.C. Mr. Takaji Kuroda, former Chief Engineer for the NEC Corporation, continues to serve as Vice-Chairman representing Japan.

DELEGATES ENVISION HAWAII CENTER FOR ASTRONAUT TRAINING & SPACE TECHNOLOGY

A bold new proposal to develop a Pacific International Center for Space Exploration (PICSE) in Hawaii was introduced by JUSTSAP delegates at the 14th Annual Workshop in Honolulu last November. The vision is to create a broad-based facility that could support astronaut training, human and robotic vehicle testing, closed-habitat life support and human factors research, public education programs, and other activities in preparation for future robotic and manned missions to the Moon and Mars.

The Center would most likely be administered by the University of Hawaii under contract with NASA and other government and private space agencies, and would draw upon Hawaii's significant scientific and engineering experience and expertise in the the fields of remote sensing, vulcanology, sensor development, geological research, astronomy, and other space-related fields.

Courtesy NASA

"This type of activity is precisely what is needed to support future space exploration," noted incoming JUSTSAP Chairman Stephen Day. "It also directly parallels what President Bush has set forth as priority goals for NASA under Project Constellation - particularly the objectives to develop innovative technologies, a knowledge base, and infrastructures that can support human exploration, as well as to promote international and commercial participation in this enterprise."

Courtesy NASA

Hawaii's volcanic origins and diverse geological terrain provide an environmental ambience not unlike the surfaces of the Moon and Mars - a fact which drew NASA astronauts to Hawaii for training during the Apollo missions in the 1960s. The islands' strategic mid-Pacific location multi-ethnic population also make them an ideal venue for hosting international conferences and programs involving representatives from government, industry and academia from around the Asia-Pacific region.

JUSTSAP will be hosting a special session on PISCE during its upcoming 2004 Annual Workshop, to be held at the Outrigger Waikoloa Resort on the Big Island of Hawaii Nov. 13-17 (see page 4 for details).

Published by the U.S. JUSTSAP Secretariat, Strategic Industries Division, Dept. of Business, Economic Development & Tourism, State of Hawaii
Mail: P.O. Box 2359, Honolulu, Hawaii 96804 / Telephone: (808) 586-2388 / Fax: (808) 586-2536 / e.mail: jcrisafu@dbedt.hawaii.gov
Editors: Frank Gargione (United States), Naoto Kadowaki (Japan), and Jim Crisafulli, JUSTSAP Secretariat - State of Hawaii
For additional information, visit our websites at http://www.justsap.us (U.S.) and http://www5e.biglobe.ne.jp/~kuroda/justsap.htm (Japan)

14TH ANNUAL JUSTSAP WORKSHOP (Continued from Page 1)

"JUSTSAP is an important ongoing relationship that strengthens our scientific ties with Japan," said Theodore E. Liu, Director of the Hawaii State Department of Business, Economic Development & Tourism, which serves as the official U.S. Sponsor for the program. "Several new dynamic proposals were introduced during last November's workshop that hold tremendous promise for future bilateral collaboration."

One of these projects, targeted to establish an international center for space exploration in Hawaii, could play a seminal role in future robotic and manned missions to the Moon and Mars (see article on Page 1). Another, to establish an East-West Space Policy Forum, will provide an important venue for space leaders from Japan and the United States to discuss critical issues relating to international cooperation among space-faring nations in the Asia-Pacific region (see article below).

Established in the early 1990s by the Japan-U.S. Leadership Council, JUSTSAP is an ongoing forum of scientists, educators, businessmen and government officials from Japan and the United States that promotes bilateral collaboration in the development and application of space-related science and technology. "JUSTSAP provides a unique forum where innovative ideas and applications can be freely discussed toward the development of collaborative initiatives of significant value to both nations," said JUSTSAP chairman, Mr. Stephen Day.

JUSTSAP supports five working groups pursuing a broad range of initiatives in satellite communications, disaster management, microgravity research, space power, and space launch infrastructure, and a special section on each is featured on Pages 3 and 4 of this newsletter. An annual workshop for all JUSTSAP delegates is held in Hawaii each November. Information on this year's meeting may be found on Page 4.

UNIVERSITY SPACE SYSTEMS SYMPOSIUM REACHES NEW HEIGHTS

More than 70 students from 12 leading universities in Japan and the United States convened in Honolulu last November for the 6th annual University Space Systems Symposium (USSS). A variety of innovative projects were presented for discussion, including CanSat design projects to be launched in August from the state of Nevada, the development of land rovers operated via internet and satellite communication links for applications such as environmental exploration and disaster management, and research involving the control of flexible spacecraft.

Established in 1998 as an activity of JUSTSAP's Small Satellite & Launchers Working Group, USSS enables top students from Japan and the U.S. to collaborate with mentors from national space agencies and institutions in the design, development and implementation of space missions. Regular USSS participants include representatives from Kyushu, Nihon, Soka, Tohoku, and Tokyo Universities, the Tokyo Institute of Technology, Georgia Tech,Santa Clara and Utah State Universities, the University of Hawaii, the University of North Dakota, and Washington University in St. Louis.

The 2004 USSS will be held Nov. 13-14 at the Outrigger Waikoloa Resort on the Big Island of Hawaii and will expand the scope of activities to include new initiatives in one or more of the following areas: underwater vehicles, unmanned aerial vehicles, space power, disaster management, and microgravity. More information on USSS and the 2004 symposium may be found on the web at: http://usss.engr.scu.edu/.

JUSTSAP TO ESTABLISH SPACE POLICY FORUM DEDICATED TO ASIA-PACIFIC ISSUES

Assembled for Space Policy Forum discussions in Tokyo last March were (from left to right): Y. Suzuki (NICT), M. Maita (JAXA), T. Iida (NICT), T. Kuroda (NEC retired), J. Pelton, (George Washington University), N. Helm (George Washington University) and N. Kadowaki (NICT).

In response to a proposal introduced at the 2003 JUSTSAP Workshop in Honolulu, a working session of JUSTSAP principals was convened last March at the newly-formed headquarters of the National Institute of Information and Communications Technology (NICT) in Tokyo, Japan, to help establish a new Space Policy Forum, the first meeting of which will convene in November 2004 on the Big Island of Hawaii at the 15th Annual JUSTSAP Workshop.

The mission of the JUSTSAP Forum is to raise awareness as to space policy issues and opportunities which exist with regard to Japan and the U.S. as well as other Asia-Pacific countries and relevant international organizations, and to attract high-level governmental officials and individuals from industry and academia to discuss space policy issues within an "independent forum". These discussions among governmental, business and academic representatives are to be held with a view to improving mutual awareness and identifying possible opportunities for bilateral or international cooperation.

Three topics proposed for the first Forum discussions in November include:

Panel One: A 21st Century Space Vision - US, Japan and the World
What is the best way ahead in space? What should we be working toward in terms of effective and reliable space plane technology and systems; a permanent lunar colony and manned missions to Mars; more cost-effective pathways to space; a Global Tele-education and Tele-health based systems via satellite; advanced remote sensing for environmental monitoring and search and rescue missions; and protection of the Earth from meteorites and comets? Where and how should the U.S. and Japan work together in developing and deploying these systems?

Panel 2: Dual Use of Defense-Related Satellite Systems
Many communications satellite systems, remote sensing, and space navigation systems are now heavily used in a dual use mode for commercial, business, and civilian applications on one hand and for defense related purposes on the other. To what extent are their advantages or disadvantages to dual use approaches? What is the future of space navigation and other dual use applications (such as communications satellites and shutter controlled remote sensing satellites)? Should there be separate defense and commercial systems? Are new strategies to protect space assets for military or dual use purposes needed or appropriate? Are there new opportunities for Japan and the US to cooperate in this arena?

Panel 3: High Priority Opportunities for Japan-US Space Cooperation
This panel will explore possible opportunities for cooperative research or demonstrations, and joint policy studies, as well as intellectual property and regulatory issues, between Japan and the United States. Potential areas for investigation include launch and propulsion systems, space power and laser systems, large aperture antenna systems or other communications systems, frequency management and planning, remote sensing, space navigation, disaster warning, alert and recovery systems, robotics and space infrastructure, commercial space stations, lunar exploration, planetary missions and solar system exploration, and/or space-related security issues.

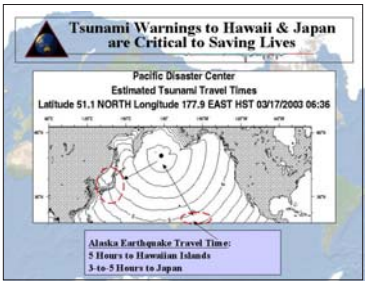
Further information on the JUSTSAP Space Policy Form may be obtained from Dr. Joe Pelton of George Washington University at: Ecjpelton@aol.com.

JUSTSAP WORKING GROUP UPDATES

DISASTER MONITORING, MANAGEMENT& MITIGATION

The Disaster Monitoring, Management & Mitigation Working Group (DM3WG) was established to research and promote more effective means for observing, responding to, and mini both natural and man-made disasters through collaboration among key agencies and organizations within the Asia-Pacific region. Principal organizations supporting DM3WG activities include the Pacific Disaster Center (PDC) in Hawaii and the Asian Disaster Reduction Center (ADRC) in Kobe, Japan.

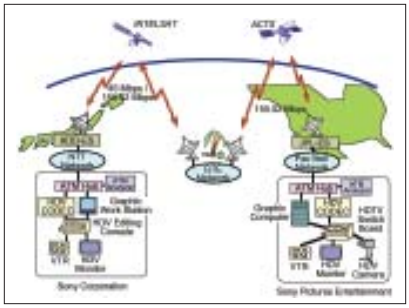
The current focus of the DM3WG is on developing and implementing a Tsunami Research and Application Program with three components. The first relates to the application of satellite communications and geo-spatial data technology toward innovative ways of recognizing and defining the physical nature of tsunamis, particularly on the open ocean. The second targets the development of more refined models of tsunamis and the application of these models to support more effective warning, preparedness and mitigation programs. The third component is centered on the development and application of appropriate level technologies for improved tsunami warnings, coupled with improved education and training for tsunami mitigation and response.



Monitoring, managment and mitigation of Pacific-wide tsunamis are a prime focus of the DM3 Working Group.

Activities to date include a gap analysis of areas in tsunami research and application that relate to the collection, fusion, analysis and dissemination of tsunami risk and impact products, as well as the further development and deployment of the PDC's Automated Tsunami Alert System for Hawaii, Japan, and other tsunami-prone nations in the region. For further information, please contact the DM3WG co-chairs (United States: Dr. Allen Clark, ClarkA@eastwestcenter.org; Japan: Dr. Satoru Nishikawa, nishikawa@adrc.or.jp).

SATELLITE COMMUNICATIONS



Graphical representation of the trans-Pacific HDR Ka-band data exchange network facilitated by JUSTSAP's SatCom Working Group using NASA's ACTS Satellite, INTELSAT, and high data rate terminals (HDRs) based in Hawaii.

The Satellite Communications (SatCom) Working Group was established to help advance space communications and applications in the Asia-Pacific basin through a series of high technology experiments, tests and demonstrations with governmental, industry and academic institutions from around the region. One award-winning project demonstrated the first trans-Pacific Ka-band link between the United States and Japan using NASA's Advanced Communications Technology Satellite (ACTS) and INTELSAT.

Currently, the SatCom WG is planning a collaborative tsunami inundation simulation with JUSTSAP's DM3 WG (see above). The combined SatCom-DM3 team is working with The Philippines National Disaster Agency and the Asian Disaster Reduction Agency in Japan to coordinate this trans-national demonstration. The team is also collaborating with NASA and other U.S. agencies to determine if remote sensing satellites such as ADIOS can be used to plot and follow the movement of a tsunami across the Pacific Basin. Japan's National Institute for Information and Communications Technology (NICT), formally the Communications Research Lab (CRL), is also engaged to help integrate remote sensors mounted in a helicopter, an airplane and possibly a high altitude platform system (HAPS) to monitor damages to beaches and seaside infrastructure from a tsunami. In addition, these mobile platforms can assist in communications coverage for the disaster response teams. More planning on this experiment will take place at the next meeting in November. For further information, please contact the SatCom WG co-chairmen (U.S.: Neil Helm, neil.helm@verizon.net; Japan: Yoshiaki Suzuki, ryo@cri.go.jp).

MICROGRAVITY AND MATERIALS RESEARCH

The mission of the Microgravity and Materials Working Group (MMWG) is to:

1. Identify and promote greater cooperation between the U.S. and Japan in microgravity research.
2. Develop greater cooperation between Japan and the U.S. in planning for ISS microgravity utilization (i.e. minimize facility duplication).
3. Promote greater recognition of the value of microgravity applications and research facilities to U.S. and Japanese industry.
4. Promote public awareness and student education in Japan and the U.S. through microgravity experiments.
5. Facilitate the exchange of knowledge between the U.S. and Japan about microgravity research and technology.

Logos of JUSTSAP flight missions

To date, the MMWG has sponsored three Japan-US collaborative microgravity experiments aboard the US Space Shuttle. The first of these, the JUSTSAP (Japan-US Thermal Science Accelerometer Project) experiment, was successfully performed on STS-95 in 1998, and the effects of residual accelerations on microgravity experiments were demonstrated, achieving some definitive experimental data that were compared with analytical and numerical solutions. The second and third experiments, JUSPRO(Japan-US Space Protein Crystal Growth) and JUSTSAPSTARS(JUSTSAP Space Technology and Research Students) Programs, which were conducted in 2003 on the ill-fated Columbia STS-107, yielded some significant results via telemetry and ground truth operation, particularly in the case of the latter. The JUSTSAPSTARS was mainly performed by a Japanese student PI and several CIs on a "Space ECOSYSTEM" through the process of "Medaka" fish hatches in space.


The ISS soars 220 miles above planet Earth.

At its 2003 meetings in Honolulu, the MMWG embraced two future experiments planned for subsequent deployment: JUSTSAP-II on a Shuttle mission to the International Space Station (as a follow-up experiment of the previous JUSTSAP-I; the effect of residual accelerations, referred to as g-jitter, on mass transport in space would be clarified), and JUSTOM(JUSTSAP Synthesis of Materials) aboard the ISS (to perform combustion synthesis with Space-DRUMS and advance the technologies of combustion synthesis which are applicable in ISRU and useful for high-temperature material processing.

However, recent policy changes implemented by NASA have put the continuation of these experiments and others like them in questionable status.


Ms. Niihori places medaka eggs in the nests of aquatic habitats for launch.

Alternative efforts that could be considered include (1) an effort to identify mechanisms by which Japan and US collaborators can perform microgravity and materials experiments on the ISS via operations on JEM or the assets of other non-US partners, (2) a search for flight opportunities using vehicles other than the Space Shuttle, and (3) adoption of joint investigations that can be done productively on the ground. Individuals having suggestions about the future direction of the MMWG are invited to contact the co-chairmen (United States: Dr. Charles Lundquist, lundquc@email.uah.edu; Japan: Dr. Osamu Odawara, odawara@materia.titech.ac.jp).

JUSTSAP WORKING GROUP UPDATES

SMALL SATELLITES AND LAUNCH VEHICLES

The Working Group on Small Satellites and Launch Vehicles (SSLVWG) is dedicated to the proposition that access to space can be made affordable to university-based scientists and engineers and their students, as well as to other smaller organizations interested in space-based applications.

To this end, the SSLVWG works to bring together both users and providers of space-related technologies to (1) develop joint (bi-lateral, and where appropriate, multi-national) space-based research and development projects, and (2) foster space-related education and training. A primary objective is to realize economies of scale and combine resources so as to facilitate space-flight projects that would not be practicable or affordable by organizations individually. Other key objectives include:

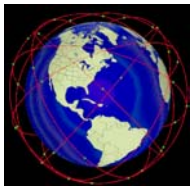
1. Encouraging and monitoring developments in low-cost modes of transportation to space for smaller payloads.

2. Identifying and facilitating joint ventures in space-based R&D which combine complementary talents of different organizations in different countries.

3. Seeking funding for such projects, typically from government agencies and larger companies - especially those that combine small contributions from many such organizations.

4. Casting a broad net for both participants and funds, including organizations from around the world that might not have sufficient resources to participate in space activities through any major space program (i.e., organizations in countries that are not "space faring").

With the passage of time have come remarkable advances in micro and nano technology that should enable highly capable space-based devices that are rugged, reliable, small, low-power, and cheap. The prospects for smaller and cheaper, yet highly capable, space-flight missions are growing apace. Consequently, the prospects for smaller missions have grown increasingly rich.



As the space programs of the world move towards satellite consellations and on-orbit assembly and services, our working group is challenged to make certain that the best ideas and the brightest people join us to achieve the promise of this element of space flight. Interested individuals are invited to contact the SSLVWG co-chairs (U.S.: Dr. Paul Coleman, paul@girvan.org) ; Japan: Dr. Tetsuo Yasaka, yasaki@aero.kyushu-u.ac.jp).

HONORING DISTINGUISHED SERVICE

Eleven service awards were presented to eight delegates, two institutions and one JUSTSAP program during the 13th Annual JUSTSAP Workshop in Honolulu last November.

The *individual* **Sustained Service Award** was presented to Mr. Neil Helm, Dr. Takashi Iida, Dr. Joseph Pelton, Dr. Takashi Iida, Dr. Frank Schowengerdt, and Dr. Yoshiaki Suzuki "in recognition of outstanding contributions toward advancing international dialogue and collaboration" through JUSTSAP.

The *institutional* **Sustained Service Award** was presented to the Pacific Disaster Center in the United States and to the Communications Research Laboratory in Japan for their ongoing support for a variety of JUSTSAP activities through the years.

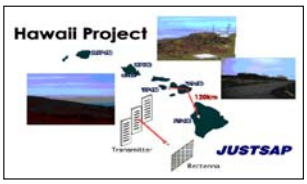
JUSTSAP's most prestigious accolade, the **Burton I. Edelson Memorial Award**, was presented to Mr. Stephen Day, Vice-Chairman representing the United States, and to Dr. Ryojiro Akiba, JUSTSAP Chairman, for "distinguished contributions toward advancing international dialogue and collaboration through JUSTSAP." Mr. Day was also elected to succeed Dr. Akiba as JUSTSAP Chairman.

SPACE POWER

Dr. Nobuki Kawashima directs a laser power beaming demonstration at the Hawaii Institute of Geophysics and Planetology, University of Hawaii, during the 2003 JUSTSAP Annual Workshop in Honolulu.

The Space Power Working Group (SPWG) is dedicated to the proposition that power from space can have a measurable impact on improving the global economy, trade, commerce, and qualities of life, with benefits to both developed and developing nations. Power from space is also essential to enable the development of space for exploration and business. Space exploration can include new systems as critical "building block capabilities" for future human and robotic space missions (e.g., space transportation vehicles, space platforms, habitats). Business opportunities can include space travel, spacecraft servicing and repair modules, tourism, and entertainment. None of these capabilities can be achieved without abundance of low-cost power.

To this end, the SPWG is working to bring together both technologists and systems developers from Japan, the United States and Europe to assess and review space and ground-related technologies, and to validate key technologies through bilateral (and, where appropriate, multinational) ground demonstrations. Another goal is to foster solar power education and training to enhance public awareness concerning the opportunities, challenges, and benefits of safe, low-cost energy. A bi-product of our collaboration is to facilitate technology development and validation that would not be practical for organizations acting individually.



Future power-beaming demo in Hawaii.

Three working group committees support a broad range of activities. The Education/Student Activities Committee sponsors cooperative student research activities, and organizes symposia and technical sessions dedicated to state-of-the-art power generation, management and transfer. The International Resarch and Demonstrations Committee fields ground laboratory experiments and field tests, space flight experiments, and formal discussions on health, safety, environmental and regulatory concerns. The Space Power Program Committee maintains relations with other interested organizations (e.g., the IAF, SUNSAT), and coordinates field trips to university and industrial facilities. For more information, please contact the working group co-chairs (U.S.: Mr. John C. Mankins, jmankins@hq.nasa.gov; Japan: Dr. Nobuyuki Kaya, kaya@kobe-u.ac.jp).

2004 ANNUAL JUSTSAP WORKSHOP

Mark your calendars for the 15th Annual JUSTSAP Workshop, to be held at the Marriott Waikoloa Beach Resort on the Big Island of Hawaii (see http://www.outrigger.com/hotels_detail.aspx?hotel=23) from November 13-17, 2004. This year's workshop will feature special symposia on disaster management, monitoring and mitigation, space power systems, microgravity research, small satellite and launcher systems, and the 7th annual University Space Systems Symposium. For more information and Workshop registration forms , visit the JUSTSAP website at: **www.justsap.us**. Registration deadline is October 5, 2004.

Why a JUSTSAP newsletter?

This issue is the first of what we hope will be a quarterly newsletter to both update current members of JUSTSAP on organizational plans and activities and to inform the broader space community about JUSTSAP and encourage their participation in programs of interest.

The newsletter is edited by Frank Gargione (gargion@attglobal.net) in the United States and by Naoto Kadowaki (naoto@nict.go.jp) in Japan, and is published byJim Crisafulli at the U.S Secretariat in Honolulu (jcrisafu@dbedt.hawaii.gov). We would welcome your comments and suggestions concerning this publication, as well as any news items, progress reports or commentaries you would like to have included in future editions. Mahalo, and Aloha!